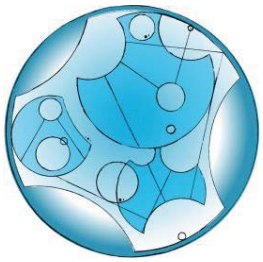

Technical Specification

SCRATCH AND DIG INSPECTOR

SavvyInspector® SIF-4E

Introduction

The SavvyInspector® model SIF-4E is our popular software assisted scratch-dig system for flat optical surfaces. Introduced in 2009 there are now over 50 systems in the field measuring scratch and dig throughout the industry. All instruments are designed specifically to reproduce the conditions of an in-reflection visual inspection as described in ANSI/OEOSC OP1.002 "Appearance Imperfections," Appendix C of MIL-PRF-13830B, "General specification governing the manufacture, assembly, and inspection of optical components for fire control instruments," and in Annex A.3 of ISO 14997, the metrology standard for the new visibility notation of ISO 10110. The factory calibrated inspection head of the SavvyInspector® uses invariant illumination and detection optics and propriety analysis software, allowing objective, repeatable, and recordable evaluation of scratch-dig surface quality.

The SIF-4E uses a 1.4 megapixel camera and higher special resolution to perform precise measurements and grading on very small features.

Product Description

SavvyInspector® SIF-4E is a complete flat-optics inspection system consisting of:

1. A custom LED-based illumination assembly.
2. A detection assembly with a digital megapixel camera.
3. A manual z-stage for focusing to different part thicknesses.
4. A manual, encoded 100 mm x-y stage platform with rails for part holding and positioning.
5. Light baffles, base-stand assembly, and cabling.
6. A stand-alone computer with proprietary SavvyInspector® analysis software.

Scratch/Dig Standards Supported

MIL-PRF-13830B
MIL-C-675C
ANSI/OEOSC OP1.002:2009 Visibility Method
ISO 10110 -7/ISO 14997 Visibility Method

Instrument Calibration – Direct Traceability to the Army Calibration Standards

The SavvyInspector® system comes from the factory with calibration files based on master scratch and dig limit standards at Picatinny Arsenal, as well as the respected Brysen, Davidson, Edmund and Thor Labs comparison standards. It is the only Army traceable scratch and dig measurement system.

Distribution in the UK & Ireland

Lambda

Characterisation, Measurement & Analysis

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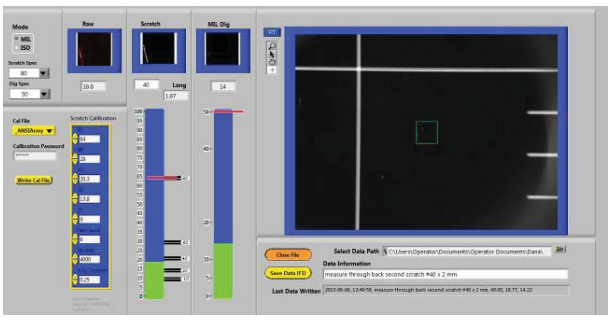
SavvyInspector® Software

The SavvyInspector® operator interface is designed for easy factory-floor operation, while expanding its application in the role of "Master Inspector" for QA, QC and MRB decisions. The operator enters the inspection level required, and then uses the manual x-y stage to locate the desired defect on the real-time viewing screen. The software reports the scratch grade or dig value automatically. Scratch lengths are measured with the click of the mouse. The "always on" inspection mode and programmable grade bars allow the operator to get real-time feedback on whether a selected imperfection is acceptable or not with a simple visual interface. There is no subjectivity; the grade is reported and the grade bar turns red if the imperfection is greater than the specification. When a careful review and documentation of a surface is required, the SavvyInspector® software provides data management tools to properly collect and file screen shots and inspection grades for each imperfection on a surface, including a summary log in CSV format for easy uploading into Excel or an inspection report. Accumulation rules can be applied using the SavvyAccumulator™ spreadsheet. Custom calibration files can be created for specific project or customer needs by the Quality Engineer as needed. The calibration data can then be saved and accessed from the inspection mode.



Screen shot of inspection mode

Feature	Specification	Comment
Inspection Head	1.4 Megapixel camera and fixed illumination and simulating reflection inspection for surface quality per MIL-PRF-13830B	Inspection setup is identical to that of MIL-PRF-13830B Annex C, MIL-C-675C and the visibility method described in both ANSI/OEOSC OP1.002:2009 and ISO 10110-7:2017 and ISO 14997:2017
Camera Field of View	9 x 12 mm, digitally zoomable	Allows rapid location of imperfections
Inspection Area	One mm square in center FOV	Allows isolation of specific imperfection for evaluation
X-Y Stages	Manual encoded x, y slide stage with >100mm travel	Encoders read out distance moved since last mouse click allowing rapid evaluation of scratch length
Focus	Manual 70 mm Z-stage for focus. Depth of focus > 1 mm	Easily accommodates thick parts
Test surface reflectivity	System can measure coated or uncoated parts, filters, windows, splitters, cubes, and most prisms.	Standard calibration files for transmissive and metalized comparison standards are provided. Some custom calibrations or part fixturing may be required.
Test surface shape	Plano or mild concave surface	Designed for flat parts, but long radius concave parts can also be inspected with the optional tip-tilt plate
Reported Values	Scratch number- 10, 20, 40, 60, 80 Dig value – continuous from 5 to 70 ISO Grade – 0.025 to 0.63	Per MIL-PRF-13830B, ANSI/OEOSC OP1.002, visibility method and ISO 10110-7/ISO 14997 visibility method
Comparison standards	Factory calibrated to FLIR/Brysen, Davidson comparison artifacts, as well as various plastic inspection paddles	Customer can generate and save calibration files for any artifact set
Instrument repeatability	> 95% repeatability of reported scratch or dig grade	Presumes > 20 measurements of a clean surface in a proper environment of a stationary part
Instrument reproducibility	> 90% reproducibility of reported scratch or dig value	Presumes the clean part is removed, replaced and repositioned to the same location > 20 times

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